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AUTHOR Dong, Yu Ren
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ABSTRACT

A study examined the supervisory relationship between a non-native English-speaking doctoral student and a native English-speaking advisor, particularly in science, focusing on factors leading to effective or ineffective supervision, advisee response to advisor guidance and assistance, and the roles played by the two participants. Subjects were three Chinese students, one female and two male, in different fields (biochemistry, genetics, ecology) and three male doctoral advisors. Data collection spanned a 6-month period, with data gathered from dissertation drafts and advisors' written comments on them, observations and field notes of writing conferences and research group lab meetings, a variety of student and institutional documents, and students' English and Chinese literacy histories. The three case studies are presented in narrative form. It is concluded that the advisor's cross-cultural awareness and the style taken in relation to the student's preference do affect dissertation supervision. Implications for further research and practice are discussed briefly. Contains 31 references. (MSE)

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A Cross-cultural Relationship between the Advisor and the Advisee: Dissertation Writing Supervision in Science

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Yu Ren Dong, Ph.D.
Assistant Professor
Department of Secondary Education and Youth Services
Queens College, CUNY
65-30 Kissena Blvd.
Flushing, NY 11367

718-997-5171 (office)
718-464-0179 (home)
718-997-5222 (fax)
yrdqc@qcvax.acc.qc.edu (email)

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Yu Ren Dong

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ABSTRACT
The give-and-take advisor-advisee relationship is crucial for non-native English speaking graduate students' writing of their dissertations in science. The investigator conducted in-depth case studies of three Chinese doctoral students who were writing their dissertations in Biochemistry, Ecology, and Genetics of a Southeastern U.S. research university. Using interviews and observations of the writing conferences and lab meetings, the investigator examined three relationships from the perspective of the advisor, the native English speaker, and the advisee, the non-native English speaker on the factors influencing successful dissertation supervision and desired roles played by both sides. The findings of the study issue the call for cross-cultural awareness and the changing orientation and commitment of dissertation supervision on the part of the advisors.

A Cross-cultural Relationship between the Advisor and the Advisee: Dissertation Writing Supervision in Science*

Introduction

With a changing configuration of graduate student body in American universities in the past fifteen years, nonnative English speaking graduate students have composed an important part of academic life Atbach (1989). According to Huckenpohler's (1991) survey, of all students receiving doctoral degrees in the fields of science and engineering in 1991 in America, 32% were non-U.S. citizens. In these fields, given that the majority of graduate faculty are native English speakers, it is not uncommon for a nonnative English speaking doctoral student to choose or to be assigned to a native English speaking professor as the dissertation advisor. Despite of a lot of anecdotal evidence of nonnative English speaking graduate students' dissertation writing agonies, cross-cultural communication breakdowns, and even dropping-out of the program, we know very little about what goes on in this peculiarly close and complicated relationship.

With a focus on the native English speaking graduate students' dissertation supervision, issues such as the desired roles played by both sides and effective supervisory models have been discussed in social sciences, education, and psychology (Connell, 1985; Hockey, 1991; Acker and Black, 1994; Seeman, 1973; Blanton, 1983), however there has been virtually no research conducted in the natural sciences targeting nonnative English speaking graduate student population. Therefore, the purpose of this study is to examine this relationship from the perspectives of the native English speaking advisor and the non-native English speaking advisee to look into 1) what does the advisor do to supervise and assist the advisee, and what are some of the factors that lead to effective or ineffective dissertation supervision in this cross-cultural context; 2) how does the advisee respond to the advisor's guidance and assistance; and 3) what are the respective roles played by the advisor and the advisee.

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*This article is based on part of the author's doctoral dissertation. For the full results of the dissertation study, see ...

Literature Review

As the culmination of the doctoral program, the dissertation, according to the Council of Graduate Schools (1990), "fulfills two major purposes: (1) it is an intensive, highly professional training experience, ... and (2) its results constitute an original contribution to knowledge in the field" (p. 30). Generally, a balanced give-and-take reciprocal relationship is agreed upon by both policy makers and researchers when discussing the doctoral dissertation supervision. According to the Council of Graduate Schools of the US (1990),

> (A)dvising is a reciprocal responsibility. Faculty are expected to be diligent in providing counsel and guidance, and to be available for consultation. They should demonstrate flexibility and critical thinking; a willingness to be challenged and to challenge constructively; and the desire to help the student become better at research and teaching than they are themselves. Students, for their part, are expected to seek out actively the guidance of their advisers. The reciprocal nature of advising can be highlighted by an exit interview with the department chair or dean in which the student's experience in the program can be fully discussed. Ideally continued support and mentorship are provided throughout a student's later career. (p. 7)

Dissertation Supervision

An effective dissertation supervision has been described as the advisor's accessibility, active involvement, and structured supervision (Markle, 1976; Dillion and Malott, 1981). Bargar and Mayo-Chamberlain (1983) recommended ways to find a rewarding and satisfying relationship based on mutual trust and respect, where dissertation advisors assist their advisees' to progress from a dependent trainee to an independent scholar through dissertation writing. Nevertheless, under the general agreement of the desired roles that the advisor and the advisee play, factors that influence on achieving this give-and-take balanced relationship in dissertation supervision are still debated (Seeman, 1976; Hockey, 1991; Dillion and Malott, 1981). Two factors evolved from the research are the quality of the supervision and the quantity of the supervision. While research on the quality of the supervision centered around the dichotomy of creativity and accountability (Seeman, 1976; Dillon *et al*, 1980); studies in the quantity of the supervision appear to point to the general inadequate quantity of the supervision. Heiss (1970) noted "an incredible lack of balance in the amount of assistance sought or received on the dissertation" (p. 221). "In some cases, after the topic is approved they (advisors) do not see the student again until he applies for approval of

his finished product. At the other extreme some sponsors ride herd on the candidate on every point and end up -as at least one faculty member in this study admitted-practically redoing the whole dissertation" (Heiss, 1970; p. 221). Hockey (1991) noted a general lack of quantity in dissertation supervision in social sciences.

One area of research looks into the advisor's supervisory styles (Heiss, 1970; Sindermann, 1987; Acker and Black, 1994). A most recent study done by Acker and Black (1994) in social sciences identified two distinctive dissertation supervisory models. One is "the technical rationality model", characterized by the advisor as "a manager or director, keeping the student motivated and on track, providing timetables and guidelines. The student is a relatively passive participant" (p. 484). The other is "the negotiated order model", characterized by that "[m]utual expectations between supervisors and students are subject to negotiation and change over time. The student, like the supervisor, participates fully in negotiating and interpreting meanings" (p. 485). Based on their observations of the one-on-one conferences between the advisor and the advisee, they suggested that supervisory models were also discipline oriented; while the technical rationality style is predominate in the sciences; the negotiated order style in education and psychology.

With a focus on the social structures in laboratory sciences, Sindermann (1985) described the unique dual roles that professors play: 1) managerial authority and 2) science-based authority. According to him, the advisor and the advisee relationship in science is likely to be a mentor--master and mentoree--apprenticeship relationship. "The typical and stereotypic association is the professor-graduate student one, in which the accumulated wisdom and experience of the senior member is transmitted over an extended period to the junior member" (p. 169-170).

Dissertation Writing in Science

The above purposes of the doctoral dissertation, however, vary from discipline to discipline and are often conditioned by disciplinary social and organizational structures, the expectations, and the nature of research. For example, in the fields of sciences in general, laboratory sciences in particular, the nature of research is to timely disseminate scientific

knowledge (Hull, 1988; Isaac *et al* ., 1992). In these fields, increasingly, the dissertation may be written as a compilation of publishable (in some cases already published) articles emerged from long-term team projects (Ziolkowski, 1990) to speed up the process of publishing scientific research findings. Therefore, the dissertation not merely fulfi"s the graduate school requirements; but functions as an initiation into the scientific discourse community and serves as an integral part of the student's career. As a result, the function of fulfilling graduate school requirements is downplayed and viewed more as a summary of the student's work, but the function of the dissemination of dissertation research results through publication is more emphasized.

Unlike advisors in humanities or social studies or education, advisors in the sciences are more involved in their advisees' dissertation research and writing, because very often their advisees' dissertation research is part of their continuing granted group project and they are usually vested as co-authors (Hagstrom, 1965). In the sciences, doctoral students work in teams and collaboration with their professors and among themselves is the norm (Trimbur and Braun, 1992; Ede and Lunsford, 1990). Thus, one the one hand, all this leads to a more informal and closer relationship between the advisor and the advisee; on the other hand, however, the collaboration operated along "hierarchical lines" (Trimur and Braun, 1992; p. 22) often results in a stratified division of labor and well defined roles played by each member on the team (Ede and Lunsford, 1990; p. 133). Within this hierarchical system, the advisor who administrates and supervises the research project automatically possesses an authoritative status, and the advisee who is actually hired by the advisor to work for him assumes a subordinate status (Hagstrom, 1965). A timely completion of dissertation articles becomes critical not only for the advisee's Ph.D. degree, but also for the advisor's career advancement and the economical needs for securing the grant.

Disciplinary Acculturation for Nonnative English Speaking Graduate Students

Contrasting North American and East Asian interpersonal relationships, Yum (1988) argued the profound impact of Confucian philosophy on the typical East Asian long-term interpersonal relationship, in which harmony, hierarchy, and reciprocity were prominent norms. Gu (1991) looked into unequal encounters, including the teacher-student interaction mainland

China. He noted the hierarchical power relationship with the teacher being the superior and the student being the inferior, which influenced their different use of language in order to fulfill their respective roles.

In her survey of 22 nonnative from 15 countries and 11 native graduate students and 13 advisors and 12 administrative officials in the departments of electrical engineering, economics, and history of four universities in the Northeast of America, Friedman (1987) identified an overall dissatisfaction felt by the majority of both American and nonnative graduate students in their advisor and the advisee relationships. Compared with their American peers, nonnative English speaking graduate students only had their advisors for professional, intellectual, and emotional help and support; and once this help was minimal, they were more devastated and some even paralyzed. In addition, she noted nonnative students' language difficulties and their native cultural and educational norms and values prevented nonnative students from communicating effectively with their advisors and establishing a good relationship. Unawareness of cultural differences in expectations on the part of the advisor resulted in their insufficient involvement and inadequate assistance in their advisees' dissertation research and writing.

Several studies on advanced second language writing and disciplinary acculturation such as Casanave (1992) and Schneider and Fujishima (1995) all reported nonnative English speaking graduate students' struggle not only with academic language use but also with their disciplinary cultures. The tremendous linguistic and sociocultural differences set barriers for the students' disciplinary acculturation and resulted in their confusion, frustration, alienation, and finally dropping out of the program. Two survey studies in particular (Shaw, 1991; Powers, 1994) touched the topic of the advisor's assistance in nonnative English speaking graduate students' dissertation writing. For example, based on the interviews with 22 non-native English speaking graduate students in various academic disciplines, Shaw (1991) found that these students, though many of them were from the sciences, drew few resources from their discourse communities other than their advisors and mainly wrote in isolation. Powers' survey revealed a conflicting result regarding the amount of assistance given and received in dissertation writing from the perspectives

of the advisor and the advisee. That was that advisors tended to estimate their assistance consistently higher than their advisees' perceptions.

In summary, the review of the relevant literature supported the need for this study. The dissertation writing supervision needs to be understood because of its powerful role played in the student's disciplinary acculturation and in the professor's development of successful intervention strategies to enhance supervision. Examining this relationship from both the advisor's and the advisee's perspectives as this study did will yield some interesting findings which can help initiate the exploration and build our understanding of this relationship.

Methodology

Three doctoral students from mainland China were identified as case study participants after an initial survey (for survey results, see Dong, 1995). Each of them represented one of the three scientific disciplines of a research university in the Southeast of America: biochemistry, genetics, and ecology. Of the three students, one was female and two were males and they were in their late twenties and the early thirties. Three dissertation advisors were all white Angle males with an age ranging from the late forties to the early sixties. They were all full professors with extensive experiences with teaching, research, and dissertation supervision in their fields. The investigator made the initial contacts of these students by phone and by interview afterwards with each of them. Upon obtaining the student's consent to participate in the study, the investigator had a brief interview with each of the professors to request participation and cooperation. Pseudonyms were also used to protect the case study participants' identity and privacy.

Data collection started in January of 1994 and ended in June 1994. Case study data were gathered from the sources, including the student's dissertation drafts and the advisor's written comments on these drafts; interviews with the advisee and the advisor individually on dissertation writing experiences and the relationship with each other; observations and field notes of writing conferences between the advisor and the advisee and lab meetings of the advisee's research group; documents including the brochures, previous publications of the student, writing manuals and

guidelines from graduate schools or journals; and literacy histories of the student's reading and writing experiences with English and Chinese.

Data analysis went through two phases: Phase 1: open coding and Phase 2: axial coding. Out of 998 coded records in the computer database, the researcher examined and identified themes and patterns as they were emerged. For example, collaboration, supervisory styles, adequacy of the supervision, perceived roles in the relationship from both sides, functions and expectations of dissertation writing, were some of the categories emerged from the initial reading of the data. Based on the open coding, the researcher started putting the data back together and making connections between categories through triangulation (Strauss and Corbin, 1990) in order to achieve a coherent whole picture of the characteristics of the advisor and the advisee relationship in dissertation writing. In doing so, the researcher searched the database for frequencies and regularities, made connections between categories and specified the context and conditions in which the categories were embedded, and explored possible reasons behind these phenomena and outcomes.

Results

Helen: An "Unusually Good Case"

Helen is a female doctoral candidate in the Department of Biochemistry. She got her BA in medicine and MA in biochemistry from Zhenjiang Medical University of mainland China. In 1990 Helen came to Miami University to pursue her doctorate in biochemistry. She was assigned to work in the lab belonging to Dr. Pike and became his advisee ever since. In fall 1993, due to her advisor's job change, Helen transferred to the same university with Dr. Pike in order to finish her program.

Helen's dissertation topic was chosen unilaterally by her advisor in 1990. It was also a continuation of the previous doctoral student's study on the structure and the functions of one of glyprotein hormones: human choriogonadotropin (hCG). The study was funded by National Institute of Health. Helen's dissertation is a traditional one, including four lengthy chapters: introduction, methods, results, and discussion, and one abstract. Helen started writing her

dissertation in January of 1994 and came up with a complete 91-page long first draft of all the chapters after only one month. Dr. Pike, Helen's advisor read it and then held two conferences (each lasted for about an hour) with her, helping her revise it. The final draft was completed in the beginning of April. Helen successfully passed her oral defense in the middle of April. With minor revisions, Helen completed her dissertation and graduated in Spring 1994.

Dr. Pike's Role in Helen's Dissertation Writing: Parental

Dr. Pike, Helen's advisor is a full professor and head of the department. Besides Helen, he was also advising six other graduate students in his lab at the time of the study. There are eleven people in his lab. Besides two Americans (including one technician), the majority are all international students, including four Chinese. Dr. Pike argued for the advantage of including international students in his lab like this:

> (T)he bottom line is that even with language difficulty, Chinese students are much, much better than American students... (They are better in) research abilities, intellectual abilities, and China had, I mean four or five percent of students going to the universities. So if we take students from Chinese universities, they have already been screened from a large pool. Now in this country, almost everyone can go to the university at some point unless they are very, very poor.

With a culturally diverse laboratory, Dr. Pike developed an awareness of cultural differences in communicating with his Chinese students. When asked, he articulated like this:

> Well, it's hard. Of course (Helen) has been here for over four years. It's certainly true when they (students) first come. And often the problem that I have with Chinese and other people too, whose native tongue is not English, is not known that they really understand what I said or not. Often they appear to be intimidated and don't want to question the professor. So I may say something and ask, "Did you understand?" and they say "yes". Sometimes I am not sure.

Both Helen and Dr. Pike viewed their relationship as a mentor-mentoree relationship. Dr. Pike made an effort in establishing a supportive and nurturing environment for his advisees through a close interaction on daily basis. According to Helen, Dr. Pike is a kind, a nice, and an approachable friend, who is always there to help. He has been known for his kindness to all his advisees in the department. The close personal relationship was evident in their daily casual meetings and going out to a dinner or a movie together on the weekends. Dr. Pike knew Helen personally well from her giving birth to a child to her mother's coming to visit. Helen mentioned

repeatedly how lucky she had been with such a nice professor like her advisor for all these years. Professionally, Dr. Pike is a teacher, an advisor, a counselor, a model writer, and a critic. He was caring and protective for his advisees in guiding them through their doctoral program, smoothing their process of disciplinary acculturation, and easing their transition from a student to a professional. Helen has been to several major conferences world wide with her advisor presenting their research results. Dr. Pike gave Helen advice for her career choice and wrote excellent recommendations for her job search. In Helen's eyes, Dr. Pike is above all an authority. Two writing conferences held by Dr. Pike illustrated this master-apprentice relationship and powerful authoritative role that Dr. Pike played. Here is an excerpt of the writing conference.

> **Dr. Pike**: Oh, you need to define that. I don't know what you mean by that (pointed to "Mn buffer" on Helen's draft).... You know you can say...
>
> **Helen**: I cannot say...
>
> **Dr. Pike**: No, you can use that name for these buffers, then you have to define what it is, like having any millimeters. I don't think you have defined it before.
>
> **Helen**: No, no. That's is the only ...
>
> **Dr. Pike**: OK. Now be careful now, (Helen), sometimes it's confusing...

Prior to her dissertation writing, Helen had already published and submitted four articles based on her dissertation research with her advisor as well as other student collaborators in their lab. The articles were published in Molecular and Cellular Endocrinology. According to Helen, her advisor wrote all these articles and only asked his student collaborators for revisions; while Dr. Pike said that only 75% of the writing was produced by him. In the interview, Helen articulated a major advantage of publishing along side her advisor and witnessing her advisor's writing of their research before her actual writing of the dissertation. The following is the translation from Chinese to English of Helen's words.

> In my case, the great help comes from my four articles that have been submitted and published already before my writing. That makes the writing much easier. The articles that have been submitted or published all mainly are written by my professor. That sets up a model for me to follow in organization and choices of words. Thinking is easier too. I could easily become congruent with the ways of thinking (that my advisor had). I can see how research results have been written... In my case, ... a lot of time has been saved. I only spent a total of one month writing and coming up with my first draft. After that I just went through revisions with my professor, which lasted two months... Also with the

> article publication, citation decision and the literature review all come easier. I know what is the best way of expressing and presenting my research, which non-native speakers often have difficulty with. From my professor's writing, I got to know how to express more precisely just by mimicking my professor's writing. In this way my language has improved. Otherwise, a student at my stage would take at least two or three months just to come up with the first draft.

Dr. Pike attributed Helen's smooth, fast, and productive process of the dissertation writing to the following two things.

> [...T]his is unusual. Normally it takes many, many paths. I think there are two things. One (Helen) is a better writer and spent more time and gave me better copies than other students; and the other thing helped is many of these, most of what (Helen) has done we have published papers... So this is an unusual case. This is unusually good.

When asked about his approach in dissertation supervision by using article publication first and dissertation writing second, Dr. Pike told this.

> [...T]he big thing is organizing because she (Helen) organized the data, she put experimental numbers, analyzed them, interpreted them, graphed them. That's an *enormous* effort. You spent a lot of time planning the experiment, and then a huge amount of time doing the experiment. And then your real work begins when you start analyzing your data. And in fact by doing manuscript periodically, you really follow all of that as you go. When you reach the end, in fact what (Helen) was able to do was to put this all together and make a nice story out of it, rather than having to go back to raw data, two or three or maybe even four years ago, when you start forgetting everything, you sort of forget the importance of it. So organization is probably at least a big part as the actual writing. Of course writing the manuscript you have the advantages that you have already interpreted the data, you said in certain words, you have references, you have enough materials now so she (Helen) was able to settle down to her dissertation, she could just pull all that. It's the heck of a lot easier.

Sam: An Isolated Writer

Sam is a male doctoral candidate in the Ecology Institute. He earned an B.S. and an MA. in biology from Nanjing University in mainland China. Sam came to America to pursue his doctoral degree in 1988. He was assigned to Dr. Well and became his advisee ever since. Compared to Helen, Sam was already a consummate writer before writing his dissertation. He co-authored a book published in Chinese on the developments of modern American ecology. Unlike Helen, Sam díd not have the opportunity to work with his advisor on the same topic, neither did he get any benefit from his advisor's grant. Due to lack of funding, the institute first got him a university-wide assistantship and then he became a teaching assistant from 1989 to the time when he graduated.

Sam chose his dissertation topic himself in 1990, with the help of his advisor, Dr. Wells, in narrowing it down. His dissertation is a compilation of three articles researching the productivity of *Spartina alterniflora*, a plant commonly called Smooth Cardgrass, grown on Sapelo Island, Georgia. Different from Helen's collaborative research mainly conducted in the lab, Sam collected his data out in the fields on the island by himself. Since there was not any other person working on his topic, Sam spent more than a year doing field work alone.

Contrasting to Helen's smooth dissertation writing and a speedy completion, Sam's dissertation writing lasted for two years. He started writing his first article in spring 1992 and finished it in fall 1992. Then he proceeded to writing his second article. However, he discontinued writing it after four drafts because of his busy teaching schedule and the "boredom" of writing. At the beginning of 1994, Sam resumed his dissertation writing by first working on the third article and finished it in March of 1994. Then he returned back to his second article and finished it in April. Sam's advisor only read each of his articles once and gave one set of comments. After that, Sam came up with the final draft and passed his oral defense in May. The committee members gave very few revision suggestions except for a few language expressions. Sam graduated in Spring 1994.

Dr. Wells' Role in Sam's Dissertation Writing: Laissez Faire

Dr. Wells was advising three graduate students including Sam at the time of the study. According to both Sam and Dr. Wells, they have a very good advisor-advisee relationship. Sam's office was right outside of Dr. Wells' and Sam could stop by Dr. Wells' office anytime that he was in. A rapport has been established at the personal level for all these years. For example, Dr. Wells helped Sam find a source of financial support one summer when Sam was out in the field collecting data. Sam and his wife were often asked for house-sitting when Dr. Wells' family was out of town for a longer period of time. Despite of this harmonious and friendly relationship, Sam was not satisfied with the amount of assistance and guidance given by Dr. Wells. One major cause of this inadequacy of supervision, according to Sam, was his advisor's distinctive style in advisement. The following is the translation of Sam's words from Chinese to English.

> My professor never writes anything for me or his students. And he seldom includes his students in his grant sponsored projects. And he would not choose a dissertation topic for his students, no matter whether they are non-native students or native students.

Dr. Wells was very open about his way of supervising his students. He articulated during the interview as follows.

> [...P]eople operate in different ways in the sciences. I want my students to come up with their own research independently. I don't want to give. I will not give them research topics and say do this. If they can't come up with a defensible research topic, then I don't want them to be my graduate students. Sometimes very seldom students and I have gone in together on a grant proposal. That of course, they have had a very defined dissertation because it's the grant proposal that gets funded. But even that had to be a large part of their creation. In (Sam)'s case, we didn't do this. He wanted to do something that was not really probably sellable as a stand-alone grant proposal.

In retrospect, Sam considered that the approach his advisor took in supervising his research and writing had both advantages and disadvantages. The advantage was that Sam learned from doing everything himself throughout the research and writing processes. However, the disadvantage, according to Sam, was over-ridden the advantage, because he didn't feel like he had received adequate help and supervision from his advisor. He had to probe in the dark and to learn from mistakes, thus delaying the completion of his program.

Sam recalled that his advisor never held any formal conference with him in the course of his data collection, nor data analysis, nor actual writing, except for two committee meetings, one held before his data collection, and the other held after his completion of data collection. Sam met his advisor frequently. However, Dr. Wells seldom checked in the progress of his research, nor did he set any guidelines or timeline for his research or writing. As a result, Sam had to take the initiative by reporting his study periodically to his advisor. During the course of the data collection, Sam reported to his advisor at least once a quarter. During the course of data analysis, Sam occasionally reported some of his significant results. When I asked, Dr. Wells confirmed the independent nature of Sam's dissertation writing.

> I don't know (when he started writing). He didn't say. The field work was finished a years ago. He has been writing pretty much all of these years. But as far as what time, I have no idea. He does it pretty much by himself than he gives me.

In spite of all this, Sam put his advisor's name on all his manuscripts planning for submission for publication. According to Sam, it is the norm in the sciences to put the name of

your advisor who supervises you in your research in any article you are going to publish. Coauthorship can also lend more credibility to your research and can even launch your career in this case. Another reason explained by Sam was his Chinese cultural influence. In Chinese culture, the teacher is like the student's parent, an authority figure, and it is especially true for the professor in the doctoral program. This culture inheritage impelled Sam to show respect for his teacher by including the advisor as a coauthor. When asked about his advisor's reaction, Sam said that they two didn't even talk about it, but his advisor accepted the coauthorship.

Mike: A "Less Able Writer"

Major in genetics and breeding, Mike earned both his BA. and MA. from Beijing Agricultural University in mainland China. He came to America first on an exchange program in 1988. He was assigned to work in Dr. Miller's lab. Later he started his doctoral program and became Dr. Miller's advisee. Unlike Helen and Sam who were represented by their advisors as good writers, Mike was described as a creative scientist but a poor writer by his advisor. Mike was open about his struggle with English writing. He said that he had a fear of writing not only in English, but also in Chinese, his native language. He joked that he was even a bad writer in Chinese. He seldom writes in Chinese and even if he writes home, his parents back home often have a hard time in understanding what he said.

Mike's dissertation consists of two articles based on their four-year team research project funded by NIH (National Institute of Health). It was an investigation of the sequence and expression patterns of ten plant actin genes in the diverse actin gene family, a plant called *Arabidopsis thaliana*. Along with four other people who were working on this research project, Mike was assigned to write the research results of the four genes out of the ten, which were going to be submitted to two prestigious professional journals: Plant Cell and Plant Journal. Mike started writing his dissertation articles which in fall 1993, however, by the time this study finished, he was still revising his drafts of the article one.

Dr. Miller's Role in Mike's Dissertation Writing: Antagonistic

Dr. Miller, Mike's advisor was advising five graduate students including Mike at the time of the study. Running a twelve people lab, Dr. Miller plays many roles, including a researcher, a teacher, an administrator, and a fund raiser to secure the funding of his lab.

Because of his own tough experience with writing when he was a doctoral student, Dr. Miller showed his intense interest in writing and his sincerity in improving his students' scientific writing skills. Writing was perceived by Dr. Miller as a critical ingredient to success as a researcher. A good bench scientist is far from enough nowadays. You have to know how to write in order to disseminate your research findings to the public in order to get the credit and survive. The book Elements of Style by Strunk and White (1979) was one of the sources that Dr. Miller drew from in his writing, and he had "copies of the book all over the lab." Dr. Miller appeared to have the orientation to take dissertation writing as a process of training his advisees to be independent writers. He articulated his changing view of dissertation writing like this:

> [I]n the earlier years, I had quite often written the entire discussion for my students' (dissertation) paper. Then I decided that wasn't really helping them, even though it's going to take me longer to have them write the discussion. I really want to take time to write the discussion with them, because my point is when they leave here, they will be able to write the discussion on their own.

The strategies that Dr. Miller took to train his advisees writing skills included 1) encouraging his students to write early, 2) doing extensive rewriting and revising on his advisee's drafts, 3) giving timeline of the writing and keeping constant communication. Dr. Miller established the lab norm of writing personal notes on their drafts to foster constant communication and to serve as the reminder for the writer. Following his advisor's suit, Mike wrote a lot of notes in bold in his text like, "(Mark, his advisor's first name), check if the abstract has to be in past tense too." or "not done yet" or "should we make a prediction here?" or "need data showing..." or "add more reference."

Dr. Miller viewed Mike as a good and a creative scientist, but a poor writer like he had been when he was at the graduate school. During the course of Mike's eight month full engagement in writing, Dr. Miller was involved actively from the start, asking for the draft from Mike regularly to

check on his progress in writing and revising each draft that Mike turned in. Besides his own intense involvement in Mike's writing, Dr. Miller also suggested Mike going to the Writing Center in the English Department on campus to get help with language, though it turned out to be not satisfying.

A warm collaborative climate and a closer and casual teacher-student relationship has prevailed in Dr. Miller's lab. All the people in their lab, including Mike, called Dr. Miller by his first name. Mike could stop by any time without making any appointment beforehand to discuss with his advisor about their research or to ask for help. Unlike most students in humanities and social sciences and education experiencing dissertation writing as a lonely struggle, Mike's dissertation articles all emerged from group information sharing, idea brainstorming, and the advisor's final decision making on outlines, themes, organizations, visual presentations, technical details, etc. at their weekly lab meetings.

However, underneath of this power sharing and collaboration is the social hierarchical structure. When asked why he often called his advisor "boss" to his back, Mike said that the relationship between him and his advisor was more like the relationship between the employee and the employer because his advisor had the money and hired him to produce something he wanted. In a sense, Mike considered their lab as a family, or patriarchy to be precise. The following is the translation from Chinese to English of Mike's words.

> There is no individual interest or free choice, everything has to be in line with the professor's research project. Everyone has to contribute to and support each other. If you are not interested in doing so, that means that you have to leave to find yourself another family.

A power struggle was inherent in their hierarchical collaboration. Recalling the early days of their research project, Dr. Miller talked about their conflict at the beginning of the collaboration.

> We actually had a few difficult moments. (Mike) particularly insisted he didn't want to give up some of the genes that he was working on, even though he hadn't found them yet. He became very selfish about it.... I tried to tell him it was already more than he or all three of them could handle.... But as new students, he just doesn't see how it is deep and complex.... So we had a big thorough discussion about this and then decided that he write the paper on these four genes,... So each person got some, so one of the reasons why he (Mike) got four is because he is so stubborn about it.... I don't like to ever tell somebody he has to do something. But in this case, I told him, 'You'd better be clearer about. Try to

> back up.' He didn't actually come to me but the other guys did, because he did one really important step and he didn't want to be open with it.

This power struggle was also evident in the determination of the timing of dissertation writing. Mike felt pushed by his advisor into writing his first article in fall 1993 before his experiments had concluded just because of the deadline for the renewal of his advisor's grant. Reflecting on his experience with dissertation writing, Mike voiced his preference for a linear sequence of writing progressing from the introduction to the discussion-- not from the methods to the results and then the introduction and the discussion, the way of writing directed by his advisor. He felt he was able to focus and to produce better writing by pacing himself rather than being pushed by the deadlines imposed by grants. The following is the translation from Chinese to English of Mike's words.

> Thinking back to my dissertation writing, another thing which I still could hardly accept is the timing of writing. My boss (Dr. Miller) put me to write early. At that time, I could hardly get the whole picture of my research and felt ill prepared. ... I am the person who needs to concentrate and devote the whole attention to it (the writing) once I start. With my experiment not finishing up, I could hardly concentrate. The whole writing process is interrupted.... The practical reason, which my understanding is that, my professor's grant is due. So he pushed us into writing. By writing early before you are ready, I could hardly produce any finished drafts, and constantly changing and adding the research findings, that interrupted the whole writing process. So that's why my writing is filled with blanks waiting to add the new findings, thus makes the whole writing process not smooth and the revision is tedious.

However, Dr. Miller felt he did the right thing by forcing Mike to write early, especially since he was a poor writer. Dr. Miller talked about this at the interview.

> I wish I had him write more earlier. I can tell you we are going through this for several abstracts in a row, and he, I don't know what he thought I was picking on him or not, but he couldn't believe this that even on a one-page abstract it would take us five drafts before I accepted it. But his writing was that bad, and it took five drafts to write a one-page abstract.

Less trust and respect on both sides causes the relationship to become painful and the writing unproductive. On the one hand, Dr. Miller was frustrated about recurring mistakes and unsolved problems in Mike's writing. But he did not take the lead in initiating the dialogue, because he believed that writing depends on instincts which you could only learn from practicing; on the other hand, Mike became fearful and withdrawn from his advisor. They both realized that their relationship was not as good as before. By the end of June, 1994 (the end of this study) and

after eight extensive revisions, Mike's writing was still a long way from being done because it was not at the level of publication. Dr. Miller talked about the dilemma they were in at the interview.

> We still have a long way to go. I'm very frustrated. We should have done or almost done by now. And the other students writing with him in parallel are almost done with all the manuscripts. But he has been having trouble. And he's still coming back, you know, there are paragraphs that I gave him references for three times in the last two years, those paragraphs are still not written. And the references are still not attached. And he is just having trouble putting all these together. He is just having a very hard time. And he is writing a lot. It's just going very, very hard for him. This paper should be ready to submit. But I know this is not his fault, so I try to be patient. But I really have trouble just by being, I find this, when we move very quickly to these drafts, this is very rewarding for me. But when I'm telling him things over and over again, and it comes back only a little bit better, I find it very frustrated.

Discussion

This study has focused on three advisor and the advisee relationships situated in the social, cultural contexts of scientific disciplines. The study examined the advisees' and advisors' constructions of the meaning of dissertation supervision and their respective roles played in dissertation writing. Conceiving dissertation supervision from those contexts, we begin to understand dissertation supervision in science.

Factors that influence dissertation supervision in the sciences

Three case studies presented here lead us to rethink about the nature of dissertation writing in the sciences. In these fields, the changing nature of scientific research has lead to a changing perspective towards dissertation writing. Dissertation writing at least in laboratory science is no more an isolated effort but a collaborative writing process through contributing expertise and sharing wisdom and information among the research group. In their dissertation writing, Helen has relied heavily on appropriating the four published and submitted articles written by her advisor and the dissertation done by the previous doctoral student on the same topic; Mike has drawn from feedback and ideas from his advisor and his peers at their lab meetings. In both Helen's and Mike's cases, their dissertation research is part of the whole group research project lasted for several years. Their dissertation advisors are their collaborators and are named as the last authors as the supervisors of the research projects. All these social, economical, historical, and personal factors add to the challenge of determining the individual contribution and achieving a give-and-

take balance in the advisor and the advisee relationship. It suggests that factors as indicated in the above need to be considered in discussing dissertation supervision and the advisor and the advisee relationship in the sciences.

Unlike the previous research findings (Markle, 1976; Seeman, 1976; Dillion and Malott, 1981), three non-native English speaking doctoral students' experiences with their advisor's advisement in their dissertation writing suggested that the accessibility to the advisor and a good personal relationship, though critical aspects of the relationship, still may not guarantee an adequate dissertation supervision and a satisfying professional relationship. Sam, though had frequent contacts and established a rapport with his advisor, however, because of his advisor's laissez-faire style, he did not receive adequate assistance and guidance from him. Mike had an easy access to his advisor too. However, because of the power struggle and lack of communication and trust in their relationship, he did not benefit from the accessibility.

Among the three relationships, Dr. Pike's parental style appears to stand out, distinguishing itself from laissez-faire and antagonistic styles. Both Helen and Dr. Pike perceived their relationship as satisfying and rewarding. According to Dr. Pike, his knowledge about the literature and experiences with research makes it easier for him to do the literature review and to construct the knowledge claims. However, Dr. Pike did not lose sight of the training function of dissertation writing. He held two writing conferences with Helen, giving and explaining the comments and suggested revisions that he made on Helen's draft, inducting Helen into scientific discourse community.

Compared to Dr. Pike, Dr. Wells' lack of interest and involvement in Sam's research, leaving Sam feeling neglected or deserted. Dr. Wells did not play the adequate role as a dissertation advisor; but shifting his responsibilities to the student. Fortunately, Sam, who happened to be not only a mature and a well disciplined scientist but also a good writer, survived. In Mike's case, Dr. Miller, who was aware of their communication problems and tremendous difficulties that Mike experienced, did not take the lead in initiating an open dialogue and reaching out to help. Dr. Miller contributed to Mike's incapability to produce a coherent written text to lack

of practice. As a work ethic, Dr. Miller believed in practice makes perfect; and he could not see why it did not work for Mike.

While a more directive and structured style is often perceived as a typical supervisory style in the sciences by the outsiders; three case studies show that the supervisory approaches taken by three advisors in the three cases varied and are influenced by the advisors' philosophies and styles of dissertation supervision, their personal and professional experiences when they were at the graduate school, and the disciplinary sociocultural dynamics.

Cross-cultural Awareness in the Advisor and the Advisee Relationship

Case study results also suggested that the purposes and the expectations of dissertation writing as well as dissertation supervision might not be shared by both the advisor and the advisee in the first place. For example, Dr. Miller expected Mike's dissertation articles to be written at the publishable level of the prestigious journals in the fields; however, Mike, who was confused and overwhelmed by the initial task of formulating what to write and then how to organize parts of his research in a coherent whole, did not share that expectation. Dr. Miller, though with a good intention and a lot of structures and strategies, his supervisory style and good will are not communicated and appreciated by his advisee. Dr. Wells viewed dissertation research and writing as an independent learning experience; while Sam expected it to be a mentor-mentoree helping process. All this indicates the need for an open communication early on in the relationship and an adjustment of the helping roles on the part of the advisor according to the advisee's needs at different stages of the supervision. These results confirmed Smawfield's (1989) and Friedman's (1987) findings of the mismatch of the institutional assumptions of dissertation writing supervision between the native English speaking advisor and the nonnative English speaking advisee. All this indicates that we need both explicit teaching of these students' the institutional assumptions and changing the faculty's orientations and commitment to cross-cultural communication.

The confusion, frustration, and isolation felt by Sam and Mike, and the dissatisfaction and frustration expressed by Dr. Miller suggest an urgent need for faculty training in cross-cultural awareness and communication skills in dissertation supervision of non-native English speaking

advisees. It is surprising that three advisors noted that they did not detect any cross-cultural differences between native and non-native advisees in their dissertation supervision, except for Dr. Pike's acknowledgment of a different style of communication for his Chinese advisees. With the growing culturally diverse student body in their laboratories, advisors need to change their orientations and styles of supervision according to their students' needs.

Three advisees, influenced by their home cultural and educational experiences and constrained by the social and organizational structures within their disciplines, all took a passive but a royal role in their relationship from being assigned to their advisors at the very beginning to the end. Helen even followed her advisor from another state to complete her study. Sam and Mike, though had reservations about their relationship, still did not change their advisors, but stayed with them until the end. In the revision process of their dissertation, the advisees tended to depend on and deferred to their advisors' revisions even though they did not understand them, because on their minds, their advisors are native speakers of English and authority figures after all. The ways that they took to communicate and interact with their advisors are strongly influenced by their cultural and educational backgrounds. At the two writing conferences, Helen kept quiet all the time except for nodding and uttering "OKs". Mike was unhappy about the timing of the writing and confused about his advisor's revisions and comments, but he deferred to Dr. Miller's decision anyway and put the blame on himself for being a poor writer. Among the three, only Sam had once gone to his advisor, directly telling him that one of his corrections was wrong. However, even he had to hold back his questions again and again because of his advisor's laissez-faire style.

When Dr. Pike's parental style matches up with the typical Chinese advising style expected in the teacher and the student relationship in mainland China (Yum, 1988; Gu, 1991), it was responded very well by Helen. Their relationship led to a timely completion of her dissertation and Helen's smooth transition into the professional world. However, when the supervisory styles are different from what they expected as in the cases of Sam and Mike, they were confused and withdrawn. They did not have the communication skills and sociocultural knowledge to articulate

their preferences and to address their concerns. Also, the impact of the hierarchical structure of science and their cultural values added to their sociolinguistic and communicative difficulties and made dissertation writing and their relationships with their advisors even more complicated and stressful.

Cultural influences are also reflected in Sam's decision of including his advisor as a co-author, even Dr. Wells did not provide adequate supervision. Sam revealed that he not only was driven by the societal force within scientific disciplines, where coauthorship is the norm; but also felt obligated to do so according to his cultural norm. As an old Chinese proverb goes: "The relationship between the teacher and the student should be like the father and the son." According to Sam, including his advisor as his co-author is his way of showing respect for his advisor in order to enhance this teacher and student relationship.

Conclusions

The naturalistic case study like this one always has a major limitation in making any generalizations due to limited sample size. Limited to Chinese doctoral students, the author has no intention of making any generalization to the large international student domain. However, the findings of the study do indicate that the advisor's cross-cultural awareness and the style that s/he takes do make a difference in dissertation supervision. With the advisor's awareness of the student's cultural and educational background and taking the style that is compatible with the student's preference, such as the parental style, their relationship is likely to be satisfying and dissertation writing is more productive. With the advisor's ignorance of the student's cultural and education background and taking laissez-faire or antagonistic style which is incompatible with the student's cultural values and individual preferences, a dissatisfying relationship or even a power struggle is likely to ensue, and thus result in the counterproductive dissertation writing for the student and the advisor. This study issues the call for the faculty training on cross-cultural awareness in dissertation supervision. Smawfield (1989) emphasized the important role that the supervisor of nonnative English speaking graduate students can play in bridging two cultures and cross-cultural communication. Learning about how the student's culture is shaped, his or her

educational background, and what is expected and valued can promote effective cross-cultural communication in dissertation supervision. Also, advisors need to know how to adapt their styles of dissertation supervision to students' cultural and individual preferences. Further studies are needed to investigate the advisor's style and behaviors in supervision of native vs. nonnative English speaking graduate students in dissertation writing contexts.

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